Bi, meeting *ei* the parallel through C in *e* and *i*, and making *ei* equal to the diagonal AB. On *ei* as a diameter describe the semicircle *egi*, and make the angles *eCf* and *iCh* respectively equal to 45 degrees, and through *f* and *h* draw the straight lines *fq* and *hr* parallel to *Ae* and meeting AB in *q* and *r*; then are *q* and *r* two other points in the curve of the ellipses.

Again, through C and D, the extremities of the diagonal CD, draw the perpendiculars Ci and *Dn*, meeting the parallel *in* in the points *i* and *n* and making *in* equal to CD. Upon *in* describe the semicircle *iln*, and make the angles *iBk* and *nBm* respectively equal to 45 degrees, and through *k* and *m* draw *kp* and *mo* parallel to Ci or *Dn*, meeting CD in *p* and *o*; then are *p* and *o* the other two determinate points in the curve of the ellipsis, so that the whole of the eight points are now determined the same as in the preceding case. Through the points thus found let the ellipsis be drawn, and it will be the figure required by the problem. And exactly in the same manner may the points for any number of ellipses be found, as in the case which follows.

Should it be required to describe a number of concentric ellipses upon the same diagonals or in the same parallelogram, the points of construction for each ellipsis are very easily determined, for we have only to divide the radius PQ, fig. 3, into as many parts, either equal or in a given proportion, as there are ellipses required, the points of division being at *amp*; then with the several radii QP, Q*a*, Q*m*, and Q*p*, describe the quadrants *Pcs*, *adb*, *men* and *pfq*, which bisect by the straight line Qe, and from the points of bisection, *c*, *d*, *e* and *f*, let straight lines *cg*, *dl*, *ek* and *fi*, be drawn parallel to AG and meeting the diagonal BF in *g*, *l*, *k*, and *i*; then will these be points in the respective ellipses, and if the same distances be set off from F along FB, an equal number of points will be determined in the opposite direction. Let a similar operation be performed with the other diagonal and an equal number of points will, in like manner, be ascertained, so that any required number of ellipses may be described with the greatest imaginable ease and facility.

It may now be useful to show in what manner the principal axes of the ellipsis are to be found, since it is from these only that the ordinates can be computed, and the truth of the construction verified, for it is not sufficient to ascribe an elliptic character to the figure, because it assumes an oval form, as numerous oval figures can be constructed on the same axes, all of them presenting the form of ellipses, while not one of them possesses the properties peculiar to the conic curve.

The equation by which the nature of the conic ellipsis is defined, may be represented in the following specific form, viz.:—

semi-trans.^{2} : semi-conj.^{2} : : rec. abss. : ord.^{2}

and making the product of the mean terms equal to the product of the extremes, it becomes *semi-trans.*^{2}×*ord.*^{2}=*semi-conj.*^{2}×*rec.abss.*; then by resolving this equation in reference to the ordinate, its value will be found by an evolution of the first degree. Thus we have

$$Ord. = \frac{semi\text{-}conj.}{semi\text{-}trans.} \sqrt{rec.\ abss.}$$

Therefore, by taking certain points in the transverse axis, and calculating the ordinates corresponding to those points by means of the above formula, the truth of the construction may then be inferred from the coincidence of the measured and calculated results. This method of proof, it is true, is not scientifically rigorous, but it is sufficiently accurate for shewing that the curves produced in this way are ellipses.

When the position of the conjugate diameters is given, that of the principal axes can easily be found, for we have only to bisect the angles made by the conjugate diameters, and the straight lines bisecting the opposite sides of the parallelogram; then straight lines drawn through the centre and the points of bisection both ways, will be the principal axes. Thus, bisect the angle FeH, fig. 3, by the straight line MN drawn through the centre *e*, to meet the opposite sides of the parallelogram in the points M and N; then is MN the position of the principal transverse axis, and if RS be drawn at right angles thereto, also passing through the centre, it will, in like manner, point out the position of the principal conjugate axis.

BUILDINGS NEAR DANGEROUS MANUFACTORIES.

THE REFEREES AND THE MAGISTRATES.

At the Surrey adjourned quarter sessions the long-pending question of "Boulanger *v.* Sugden," on the construction of the Metropolitan Buildings Act, came on on Tuesday in last week, before Mr. Puckle and a full bench of magistrates, at the Sessions-house at Newington, for adjudication. The facts of the case (being no doubt familiar to our readers) were briefly these,—that Mr. Sugden, a builder, had erected certain houses near the Bermondsey New-road, within a few feet of Mr. Boulanger's manufactory, where a dangerous business is carried on as a hat japanner, and the official referees appointed under the Act had fully investigated all the circumstances, and, by their award, declared the erections of Mr. Sugden to be illegal.

Mr. Ballantine addressed the jury on the facts of the case, and proved that the business was dangerous, by Mr. Hudson, the surveyor to the West of England Insurance Office, a gentleman from the Norwich Union Fire Insurance Office, Mr. Wilson, foreman to Mr. Boulanger, Mr. Henry Hobbs, a manufacturing chemist, Mr. Richard Phillips, professor of chemistry to the Commissioners of Woods and Forests, and others.

Mr. Petersdorff, for the defence, contended that the business was not dangerous, and that these premises did not come under the operation of the Act, as they were partly commenced before it came into operation; and called Mr. Porter, the surveyor of Lambeth, who stated that these premises were commenced in 1844, so as to evade the Buildings Act; a person, named Garratt, a japanner, who denied that oil and turpentine were inflammable; and Mr. Clarke, who attempted to prove that the business was not dangerous.

Mr. Hesketh, the district-surveyor, deposed that when the houses were in course of erection Mr. Sugden told him that Mr. Boulanger could be turned out at any moment, or he should not have allowed them to proceed; and it was only afterwards that he knew Mr. Boulanger had a long lease of the premises.

After Mr. Ballantine had replied on the whole case, the chairman, having summed up, the jury retired, and after half an hour's absence returned into court with a verdict that the business was not of a dangerous nature. This verdict was received with manifest surprise. As three other cases remained to be disposed of, an application was made by Mr. Boulanger's counsel to allow a new jury to be empanneled to try them on a future day. The chairman refused to allow a new jury; whereupon Mr. Boulanger's counsel said it would be vain to enter into the cases with the present jury, and should for his part decline any further part in the matter. The jury then, without evidence, gave verdicts for the defendants in the three other informations!

DEE BRIDGE: THE REMAINING RIBS.

The directors of the Chester and Holyhead Railway are now making preparations to test the fellow rib to the one broken by the late lamentable accident.

It has been removed from its original position to the abutment on the Saltney side of the river, and placed upon supports of masonry erected for that purpose, and they are now engaged collecting railway bars to weight it with; the test as recommended for bridges of this character in a former number of this journal. We believe it is intended to test this rib to its breaking weight, and this, if correctly and carefully done, will set at rest the much disputed question of the power of these ribs to sustain the load they were intended to support, which will be exceedingly satisfactory, so far as a weight at rest goes; but a further test is wanted, and that of a totally different character: we want data to calculate the effect of vibration, oscillation, and concussion, occasioned by the transit of heavy loads at varying velocities. These are the destructive agents of both wrought and cast iron, as evidenced in the former by the repeated failures of the axles of engines, carriages, &c., and the necessity there exists for their being frequently changed; and in the latter, by that of cast-iron girders. Cast-iron is a material so brittle in its nature, that girders are frequently broken by the motion of the carriages upon which they are being conveyed, as frequently in the course of erection by sudden jerk, from the slipping of the chains or otherwise; and if accident should occur, and the girder fall, a fracture is the inevitable result. Under these circumstances, it may be asked, is cast-iron fit for bridges of this character? Is a material that requires so much care in its preparation (as they are frequently broken at foundries), in its removal, and erection, fit for railway structures, where it is at all times subject to those strains and sudden blows just enumerated? The unhesitating answer is, no! and the sooner it is abandoned for railway purposes the better, either by the good sense of railway directors themselves, or by legislative enactment.

We must not be lulled into security by the statement, that this is a solitary instance of failure: why, they are *too numerous* to mention, as is well known to railway officials, but as they have not been attended with fatal consequences, they have not been made public. Accidents of this kind are always hushed up, as that at the Tam Valley Bridge, at Tamworth, would have been, had it not been for the vigilance of the editor of the *Birmingham Journal*.

Mr. Stephenson, himself, admits that cast-iron *alone* is not a suitable material for railway bridges, or he would not have brought to its aid as he has done (though erroneously applied), wrought-iron tension bars in many cases similar to the Dee Bridge, and in other cases, timber.

The bridge is now open for passenger traffic, the ribs having been supported at intervals by piles driven into the bed of the river; and we believe it is the intention to strengthen this bridge by throwing out struts from the piers and abutments to the joists of the ribs, and connecting those struts with horizontal pieces of timber or collar-beams secured to the central division of the rib. Surely if the bridge requires this foreign aid, it may be considered an additional argument against the further use of cast-iron for such purpose.

B. B.

N.B. Should the bridge be strengthened in the way proposed, the position of the ribs should be altered, as a curve in a bridge of this nature is exceedingly objectionable.

FOREIGN ARCHITECTURAL AND COLLATERAL INTELLIGENCE.

Contracts and Tenders—in Egypt.—The works of the embankment of the Nile proceed satisfactorily, and it is expected to see them in an adequately advanced state at the period of the next inundation of the river. The estimates first made by the engineer amounted to *about* two millions of dollars—but now the same party states them at six millions; and the viceroy, who seems to be quite awake, and prepared for such contingencies, says that he thinks they will be near eight millions. The worst is, that some believe that the work will not answer its purpose.

Statues of great Men—on the Continent.—The colossal image of Frederic the Great, made of cannon by the royal founder, Mr. Klagemann, at Bresslau, has been completed, and brought from the arsenal of that city to the Guard-Place. The elegant pedestal of Silesian marble made by Stonemason (*Steinmetzmeister*) Mr. Burgerstab, is also near its completion—and the festival inauguration of the monument will take place at the next Bresslau wool fair.

Public Sitting of the French Academy.—20th July. The chair was taken by Mr. Reinaud, who distributed a number of prizes, of which we may mention the following. A medal was given to Mr. A. Lenoir for his "*Etudes* on the Gothic Architecture of France;" to Mr. de Caumont for "Monumental Statistics of Calvados." Numismatic prizes were given to Messrs. G. Ricci and Leconintre-Dupont for their works on the coins of *Luceria*, and those of Normandy and Poitou respectively. Mr. Lenormant read his report on the *Memoirs* sent, and expatiated on the daily increased difficulty of selecting amongst such a mass of monographies—but concluded by saying very truly: "it is out of such provincial monographies that the history of the country is to be composed." The following authors

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